MAK HILL Publications Research Journal of Medical Sciences

Research Article
doi: 10.59218/makrjms.2023.10.30.34

Knowledge Attitude and Practice About Biomedical Waste Management Among Healthcare Workers in Tertiary Care Government Hospital in North Karnataka

[1]Mahesh B. Tondare, [2]Sachin Gudage, [3]Swetha Kunkeri, [4]Deepti Shetty and [5]Varsha Tondare

[1]*Department of Community Medicine Bidar Institute of Medical Sciences, Bidar, India*
[2]*Department of General Medicine, Bidar Institute of Medical Sciences, Bidar, India*
[3]*Department of Psychiatry, Bidar Institute of Medical Sciences Bidar, India*
[4]*SNCU (NHM), Hassan Institute of Medical Sciences, Hassan, India*
[5]*100 Bedded MCH Hospital, Bidar, India*

ABSTRACT

Bio-medical wastes produced during health care activities has a higher potential for infection and injury than any other type of waste among healthcare workers. Studies in India and other developing countries have shown lack of knowledge and poor practice of biomedical waste (BMW) management. BMW handling rules have been notified in 1998 and updated in March 2016. Health care setting is a major contributor to biomedical wastes. BMW management is an integral part of the infection control program and if mismanaged, medical wastes can contaminate the entire environment of the hospital. The aim of the study is to: (1) To assess the knowledge of healthcare workers in tertiary care govt hospital about biomedical waste management, (2) To assess the attitude and practice of biomedical waste management among healthcare workers in tertiary care govt hospital. An observational survey will be conducted in Tertiary care hospital under Bidar Institute of medical Sciences, Bidar after taking Institutional Ethics Committee. Healthcare workers of hospital i.e., nursing staff, laboratory technicians and class IV workers were enrolled into the study after taking informed consent. Study was done by using a semi-structured questionnaire by personnel interview method or by using google form based on feasibility. The questionnaires include socio-demographic particulars, working patterns, work experience, questions about knowledge and perception about biomedical waste management. Results: 205 Nursing staff, 51 Laboratory technicians and 70 class IV workers participated in the study. The knowledge level of BMW management among the health workers was around 74% whereas current practice of it among them was around 73%. The Knowledge and Practice of BMW management was more among nursing staff followed by Lab. Technicians and low among Class-IV workers. Despite of training in BMW management the awareness level and current practice of BMW handling appears to be less among class-IV workers who are exposed to it at very frequently and hence are at high risk of getting infections compared to others.

OPEN ACCESS

Key Words
Bio medical waste, knowledge, attitude, practices

Corresponding Author
Deepti Shetty,
Paediatrician, SNCU (NHM), Hassan Institute of Medical Sciences, Hassan, India

Author Designation
[1-3]Assistant Professor
[4,5]Paediatrician

Received: 25 September 2023
Accepted: 7 October 2023
Published: 8 October 2023

Citation: Mahesh B. Tondare, Sachin Gudage, Swetha Kunkeri, Deepti Shetty and Varsha Tondare, 2023. Knowledge Attitude and Practice About Biomedical Waste Management Among Healthcare Workers in Tertiary Care Government Hospital in North Karnataka. Res. J. Med. Sci., 17: 30-34, doi:10.59218/makrjms.2023.10.30.34

INTRODUCTION

Biomedical waste (BMW) refers to waste produced during the diagnosis, treatment, immunization of humans or animals, research activities related to these processes, or the production/testing of biological materials. In hospitals, approximately 80% of waste falls under the category of general waste, while the remaining 20% includes infectious, toxic, or radioactive waste. Among this 20%, a portion is highly infectious and hazardous, posing significant risks to society and the environment if not properly segregated and disposed of GIMEF[1] and Joseph *et al*.[2].

Improper disposal of BMW or hospital waste and exposure to such waste present serious threats to the environment and human health. The management of BMW requires specific treatment and handling procedures before final disposal, a challenge compounded by the prevalence of diseases like HIV, hepatitis B and hepatitis C[3-5].

To address these concerns, specific guidelines have been established for the segregation and management of BMW. The law mandates schedules and the availability of treatment facilities such as incinerators, autoclaves, microwave systems, or common waste treatment facilities. In 1998, the Government of India introduced the "Bio-medical Waste (Management and Handling) Law" to regulate this aspect[5,6].

While there is a growing global awareness among healthcare professionals about the hazards and appropriate management practices, the level of awareness in India has been found to be inadequate. The success of biomedical waste management programs hinges on the knowledge and actions of healthcare workers (HCWs)[2-6].

With this context in mind, a study was designed to evaluate the knowledge and current practices of biomedical waste management among healthcare workers at a tertiary-level teaching hospital.

MATERIALS AND METHODS

An observational survey will be conducted in Tertiary care hospital under Bidar Institute of medical Sciences, Bidar after taking Institutional Ethics Committee. Healthcare workers of hospital i.e., nursing staff, laboratory technicians and class IV workers will be enrolled into the study after taking informed consent. Study was done by using a semi-structured questionnaire by personnel interview method or by using google form based on feasibility.

By considering the knowledge of Biomedical waste management among the workers as 50% among all, the sample size calculated was 100 by using the formula:

$$n = \frac{4pq}{E^2}$$

Where:

n = Sample size
p = Prevalence of rural women admission to the hospital
q = No admission of rural women to the hospital
E = Allowable error of 10

The questionnaires include socio-demographic particulars, working patterns, work experience, questions about knowledge and perception about biomedical waste management. A formal sensitization session on Biomedical waste management guidelines will be organized after collection of data for the participants followed by post-test to test increase in level of awareness. The data collected will be entered in excel sheet and analysed for percentage, proportion and association between variables.

RESULTS

205 Nursing staff, 50 Laboratory technicians and 70 class IV workers participated in the study as shown in Fig. 1.

According to Table 1, nearly equal distribution of the participants was present in each age group and Gender. Education wise the levels were more among Nursing and Lab tech (compulsory requirement for the post) whereas class-IV have education level up to PUC (10%) only. Around 50% of the health care workers have experience level up to 5-15 years whereas 18% workers were new (<5 years) and 25% were working since >15 years.

Table 2 shows that overall level of knowledge based on correct answers by the health care workers was as high as 92% (minimum 57%) whereas working category wise the knowledge regarding important aspects of BMW was high among Nursing staff (min 63% to max 100%) followed by Lab. Technicians (min 66% to max 100%). The knowledge level among Class-IV workers were found to be as low as zero percent to highest 64%.

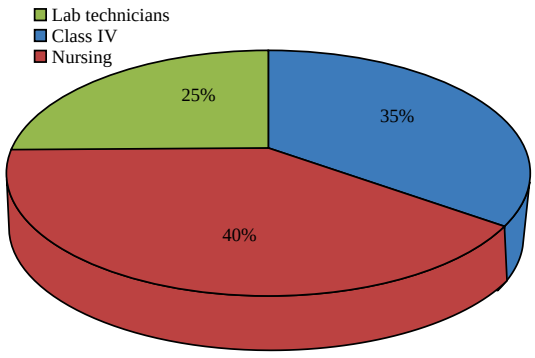

Fig. 1: Percentage distribution of category of health care workers

Table 1: Socio-demographic distribution of study participants

Variables	Nursing staff (n = 205)	Lab. Tech. (n = 50)	Class-IV (n = 70)	Total (n = 325)
AGE (years)				
20-30	102 (50%)	10 (20%)	07 (10%)	94 (29%)
31-40	41 (20%)	12 (24%)	14 (20%)	68 (21%)
41-50	51 (25%)	13 (26%)	21 (30%)	88 (27%)
51-60	10 (05%)	15 (30%)	28 (40%)	78 (24%)
Gender				
Male	72 (35%)	23 (45%)	42 (60%)	153 (47%)
Female	133 (65%)	27 (55%)	28 (40%)	172 (53%)
Education				
Primary	00 (0%)	00 (0%)	03 (05%)	07 (02%)
High school	00 (0%)	00 (0%)	60 (85%)	98 (30%)
PUC	00 (0%)	00 (0%)	07 (10%)	14 (04%)
Graduate	185 (90%)	48 (95%)	00 (0%)	195 (60%)
Postgraduate	20 (10%)	02 (05%)	00 (0%)	16 (05%)
Working since (years)				
<5 years	41 (20%)	12 (25%)	07 (10%)	59 (18%)
5-10	51 (25%)	15 (30%)	14 (20%)	81 (25%)
11-15	76 (37%)	04 (08%)	13 (18%)	78 (24%)
15-20	16 (08%)	08 (15%)	20 (28%)	55 (17%)
>20	20 (10%)	11 (22%)	16 (24%)	59 (18%)

Table 2: Knowledge level about biomedical waste management among participants

Knowledge questions	Expected answer	Nursing staff (n = 205)	Lab. Tech. (n = 50)	Class-IV (n = 70)	Total (n = 325)
Do you know about different sources of BMW generation?	Yes	129 (63%)	34 (68%)	30 (43%)	185 (57%)
Do you know what the health hazards of BMW are?	HIV/hepatitis	205 (100%)	50 (100%)	41 (59%)	280 (86%)
Do you know about segregation of BMW at point of generation?	Yes	180 (88%)	45 (90%)	35 (50%)	244 (75%)
Do you know what the color-coding system for BMW are?	Red, yellow, blue, black	192 (94%)	43 (86%)	40 (57%)	257 (79%)
Do you know about the Biohazard symbol?	Identified correctly	201 (98%)	46 (92%)	20 (29%)	234 (72%)
Do you know what type of container is used for sharps?	White puncture proof	195 (95%)	47 (94%)	36 (51%)	260 (80%)
Personal protective measures are not necessary for handling BMW?	No	197 (96%)	45 (90%)	45 (64%)	273 (84%)
Do you know Proper BMW disposal is important to prevent infection transmission?	Yes	193 (94%)	46 (92%)	40 (57%)	263 (81%)
Do you know HIV/Hepatitis is transmitted from BMW?	Yes	201 (98%)	48 (96%)	32 (46%)	257 (79%)
Biomedical Waste (Management and Handling) Rules were first proposed in which year	1998	129 (63%)	33 (66%)	00 (00%)	299 (92%)
Average number of participants with positive knowledge regarding BMW management		182 (89%)	44 (88%)	32 (46%)	241 (74%)

Table 3: Current practice related to biomedical waste management among participants

Practice related questions (expected answer 'YES')	Nursing staff (n = 205)	Lab. Tech. (n = 50)	Class-IV (n = 70)	Total (n = 325)
Do you practice color-coding system for segregation of BMW?	166 (81%)	40 (80%)	40 (57%)	237 (73%)
Are you wearing gloves while handling BMW?	154 (75%)	34 (68%)	48 (69%)	131 (71%)
Do you close the containers of BMW after use?	160 (78%)	33 (66%)	34 (49%)	211 (65%)
Weather you have taken Vaccination for Hepatitis B or Tetanus Toxoid.	195 (95%)	48 (96%)	42 (60%)	270 (83%)
Do you wash hands with soap & water after disposal of BMW?	180 (88%)	45 (90%)	35 (50%)	244 (75%)
Average number of participants with positive practice of BMW rules	172 (84%)	40 (80%)	40 (57%)	237 (73%)

Table 4: Association between knowledge and practice among health care workers

BMW management	Variables	Nursing (205)	Lab. Tech. (50)	Class-IV (70)	χ^2 value	p-value
Knowledge	Correct	71	44	32	42.69	<0.0001*
	Not correct	09	06	38		
Practice	Correct	66	40	40	15.015	<0.0005*
	Not correct	13	10	30		

*Statistically significant

Table 3 shows the current practice level of the health care workers regarding BMW management according to which, nursing staff found practicing BMW management to maximum extent (75-95%) followed by Lab. technicians (66-96%) but the Class-IV workers practice status was found low (49-69%). Majority of the Health Care Workers underwent formal training in BMW management organized by the hospital at least once (Nursing 100%, Lab. Tech 96% and Class-IV 91%).

Table 4 shows that significantly less knowledge questionaries were answered correctly by Class-IV workers compared to Nursing and Lab. Technicians whereas similar trend was observed with respect to Practice of BMW management during their day today work.

DISCUSSIONS

The recent study revealed that the level of knowledge among Nursing staff was approximately 89%, followed by Lab Technicians at around 88% and Class-IV workers at 46%. In terms of the correct implementation of BMW (Biomedical Waste) management practices, Nursing staff scored approximately 84%, Lab Technicians scored 80% and Class-IV workers scored 57%.

In a study carried out by Das *et al*.[7] at a tertiary care hospital in West Bengal, an evaluation of the knowledge and awareness regarding the management of biomedical waste (BMW) among junior doctors revealed that only 29.5% possessed an understanding of the various methods for the final disposal of BMW and merely 76.4% were aware of the different types of color-coded bags used for BM waste collection.

Sharma *et al*.[3] conducted research that indicated a significant deficiency in the level of knowledge and awareness regarding the generation hazards, legal aspects and management of biomedical waste among healthcare personnel. Surprisingly, the study found that 36% of nurses had an extremely poor understanding of biomedical waste and only 15% of Class-IV employees demonstrated an excellent awareness of biomedical waste management practices. Prashanth *et al*.[4] study underscored a notable disparity in knowledge, attitude and practices related to BMW management among nurses, laboratory technicians and Class IV employees.

Biswas and Das[5] observed that the majority (60.6%) of the study population belonged to the age group of 21-30 years. About 35.8% had worked in the hospital for one year, while 29.8% had worked for 2-5 years. All participants had heard of BMW management but only 1.5% had received formal training. Additionally, 6.6% were aware of the five-color coding system used for waste segregation, including red, black, yellow, blue bags and white puncture-proof containers. Furthermore, 31.3% knew the correct disposal method for sharps and approximately 70.2% of respondents were aware of the proper use of gloves and masks together.

Rao *et al*.[8] examined knowledge levels regarding general information about Healthcare Waste (HCW) and found that the mean score was statistically highest among doctors (10), followed by nursing staff (9.3) and lowest among housekeeping staff (7.5).

Deress *et al*.[9] assessed 296 healthcare professionals and found that 168 (56.8%), 196 (66.2%) and 229 (77.4%) possessed adequate knowledge, a favorable attitude and adequate practices scores, respectively. Regarding associated factors, those with MSc and MD+ degrees (AOR: 4, 95% CI: (1.37, 149.52)), BSc holders (AOR: 2.53, 95% CI: (1.47, 4.38)) and those with access to color-coded bins (AOR: 7.68, 95% CI: (3.30, 17.89)) were more likely to have adequate knowledge, a favorable attitude and adequate practice scores.

Imchen *et al*.[10] discovered that a total of 78% of healthcare personnel had received training in BMW management. Most doctors (76.2%), staff nurses (70.6%) and laboratory technicians (72.2%) had received Hepatitis B vaccination and tetanus toxoid (TT) injections. Additionally, multivariate logistic regression revealed a significant association between waste segregation practices and occupation status and training.

Anand *et al*.[11] conducted a study involving 305 participants, including doctors, nurses and lab technicians. Among them, knowledge, attitude and practices related to biomedical waste management were found to be very low among Class IV employees. Knowledge about different BMW categories was good among doctors (91.6%) but only 72.7% of nurses, 66.6% of lab technicians and 25% of Class IV employees were aware of it. Knowledge about BMW rules and regulations was least among Class IV employees (16.7%), followed by nurses (45.4%), lab technicians (40%) and doctors (70.8%).

CONCLUSION

In general, health workers demonstrated satisfactory knowledge and practices regarding Biomedical Waste (BMW) management. However, when specifically considering the Class-IV category, their understanding and adherence to BMW management were notably lower. Consequently, it is imperative to organize ongoing training sessions for all health workers, with a particular emphasis on those in the Class-IV category. Furthermore, the hospital authorities should enforce the regulations governing BMW management rigorously at all organizational levels, ensuring continuous supervision and compliance.

REFERENCES

1. GIMEF., 1998. Bio-Medical Waste (Management and Handling) Rules. Gazette of India.
2. Joseph, L., H. Paul, J. Premkumar, Rabindranath, R. Paul and J.S. Michael, 2015. Biomedical waste management: Study on the awareness and practice among healthcare workers in a tertiary teaching hospital. Indian J. Med. Microbiol., 33: 129-131.
3. Sharma, A., V. Sharma, S. Sharma and P. Singh, 2013. Awareness of biomedical waste management among health care personnel in Jaipur, India. Oral Health Dent Manag., 12: 32-40.
4. Prashanth, V., H. Jadhav, A. Dodamani, G. Dodamani and A. Vishwakarma, 2017. Assessment of knowledge, attitude and practices regarding awareness of biomedical waste management among health care personnel: A cross-sectional survey. J. Oral Health Community Dent., 11: 8-12.
5. Biswas, R. and S. Das, 2016. Awareness and practice of biomedical waste management among healthcare providers in a tertiary care hospital of west Bengal, India. Int. J. Med. Public Health, 6: 19-2.

6. Pandit, N.B., H.K. Mehta, G.P. Kartha and S.K. Choudhary, 2005. Management of bio-medical waste: Awareness and practices in a district of Gujarat. Indian J. Public Health, 49: 245-247.
7. Das, P., R. Pal and M. Basu, 2012. Assessment of future physicians on biomedical waste management in a tertiary care hospital of West Bengal. J. Nat. Sci., Biol. Med., 3: 38-42.
8. Rao, D., M.R. Dhakshaini, A. Kurthukoti and V.G. Doddawad, 2018. Biomedical waste management: A study on assessment of knowledge, attitude and practices among health care professionals in a tertiary care teaching hospital. Biomed. Pharmacol. J., 11: 1737-1743.
9. Deress, T., F. Hassen, K. Adane and A. Tsegaye, 2018. Assessment of knowledge, attitude and practice about biomedical waste management and associated factors among the healthcare professionals at debre markos town healthcare facilities, Northwest Ethiopia. J. Environ. Public Health, 2018: 1-10.
10. Imchen, T., R. Kumari, J.V. Singh, K. Srivastava and A. Singh, 2017. Study of biomedical waste management among healthcare personnel at a tertiary hospital in Lucknow District. Int. J. Community Med. Public Health, 4: 1483-1487.
11. Anand, P., R. Jain and A. Dhyani, 2016. Knowledge, attitude and practice of biomedical waste management among health care personnel in a teaching institution in Haryana, India. Int. J. Res. Med. Sci., 10: 4246-4250.